

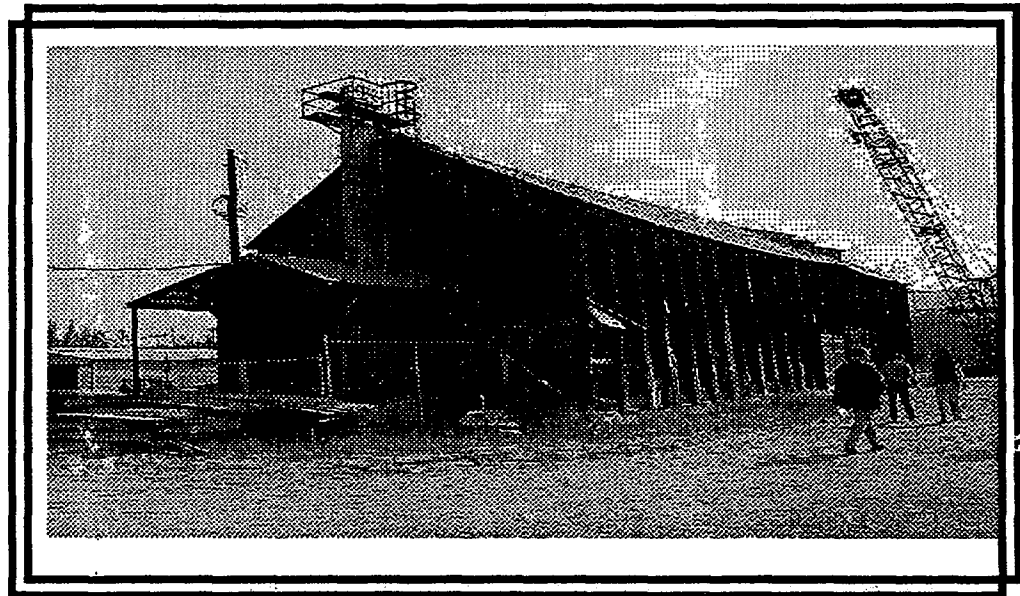


EPA
Region 8

U.S. Environmental Protection Agency
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Export Plant Removal Action Scope of Work

Libby, Montana
Time-Critical Removal



U.S. Department of Transportation
Research and Special Programs Administration

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Contents

SECTION 1	1-1
1.1 INTRODUCTION	1-1
1.2 BACKGROUND INFORMATION FOR OPERABLE UNIT 01	1-1
1.2.1 Current Ownership	1-1
1.2.2 Current Usage	1-1
1.2.3 Historic Usage	1-4
1.2.4 Operable Unit 01 Area (Acreage)	1-4
1.2.5 General Condition of Operable Unit 01	1-4
1.2.6 Soil Conditions	1-6
1.2.7 Existing Infrastructure and Utilities	1-6
1.2.8 Existing Vegetation	1-7
1.2.9 Availability of Water	1-7
1.2.10 Surrounding Properties	1-7
SECTION 2	2-1
2.1 TEMPORARY RE-LOCATION OF BUSINESS	2-1
2.2 PROJECT EXECUTION PLANS	2-1
2.3 PRE-EXCAVATION & PLANNING ACTIVITIES	2-2
2.3.1 Test Pit Program	2-2
2.3.2 Conduct Land Survey	2-3
2.3.3 Inventory and Removal of Property Contents	2-3
2.3.4 Prepare Health and Safety Plan	2-3
2.3.4 Construction Quality Control and Quality Assurance Plan	2-4
2.3.5 Prepare Air Monitoring Requirements	2-4
2.3.6 Prepare Decontamination and Dust Suppression Requirements	2-7
2.3.6.1 Decontamination Procedures	2-7
2.3.6.2 Personnel Decontamination	2-7
2.3.6.3 Decontamination of Construction Equipment	2-7
2.3.6.4 Decontamination of the Contents of the Buildings	2-7
2.3.6.5 Decontamination of the Buildings	2-8
2.3.6.7 Dust Suppression Procedures	2-8
2.4 MOBILIZATION & SITE PREPARATION	2-9
2.5 REMOVE AND DECONTAMINATE SALVAGEABLE INVENTORIED PROPERTY	2-10
2.6 REMOVE AND DISPOSE OF NON-SALVAGEABLE INVENTORIED ITEMS	2-10
2.7 GROSS ASBESTOS CONTAMINATION REMOVAL	2-10
2.8 CONTROLLED DISMANTLING AND DEMOLITION OF STRUCTURES	2-11
2.9 FINAL BUILDING DECONTAMINATION, SEALING & TESTING	2-11
2.10 EXCAVATION	2-11
2.11 WASTE LOADING AND TRANSPORTATION	2-12
2.12 WASTE DISPOSAL	2-12
2.13 IMPORT CLEAN BACKFILL MATERIAL AT OPERABLE UNIT 01	2-14
2.14 BACKFILL AND COMPACT AT OPERABLE UNIT 01	2-14
2.15 GRADING	2-14

2.16	RESTORATION.....	2-14
2.17	CLOSURE AND INSTITUTIONAL CONTROLS.....	2-14

APPENDIX A PHOTOGRAPHS OF THE FORMER EXPORT PLANT

APPENDIX B TEXT PORTION OF EPA SAMPLING AND QUALITY ASSURANCE
PLAN

Section 1

Introduction

1.1 Introduction

This Scope of Work (SOW) provides detailed requirements to be followed by the Respondent in performance of the Removal Action at the Export Plant which is a portion of the Libby Asbestos Site (the Site). The Site is located in Montana, within Sections 3 and 10, T.30N., R.31W. of the Libby Quadrangle, in the county of Lincoln; the Export Plant (herein referred to as Operable Unit 01) is located near the center of the Site, on the northern edge of Libby. This SOW is for the removal of asbestos contamination at Operable Unit 01 and was prepared by EPA with the assistance of the Environmental Engineering Division (DTS-33) of the John A. Volpe National Transportation Systems Center (Volpe Center).

For the purpose of this SOW, items requiring EPA approval refers to approval by the EPA On-Scene Coordinator (OSC) or his designated field representative. In the event that there is a conflict between this SOW and the Unilateral Administrative Order (UAO), the UAO shall take precedence.

1.2 Background Information for Operable Unit 01

A portion of the information included in this section was obtained during a walkover conducted from April 11-12, 2000 and from other documentation provided to the Volpe Center by EPA. Figure 1-1 provides the general locus plan of Operable Unit 01 and the former vermiculite mine. Figure 1-2 provides the location of Operable Unit 01 and the former vermiculite mine on the USGS Quadrangle.

1.2.1 Current Ownership

Operable Unit 01 is currently owned by the City of Libby, Montana and is leased to a lumberyard and building materials supplier. Operable Unit 01 also includes a portion of the adjacent youth baseball fields, north of the lumberyard.

1.2.2 Current Usage

Operable Unit 01 is currently operated as a lumber planing operation, lumberyard and building materials supplier. Photographs of Operable Unit 01 taken during the walkover are provided in Appendix A.

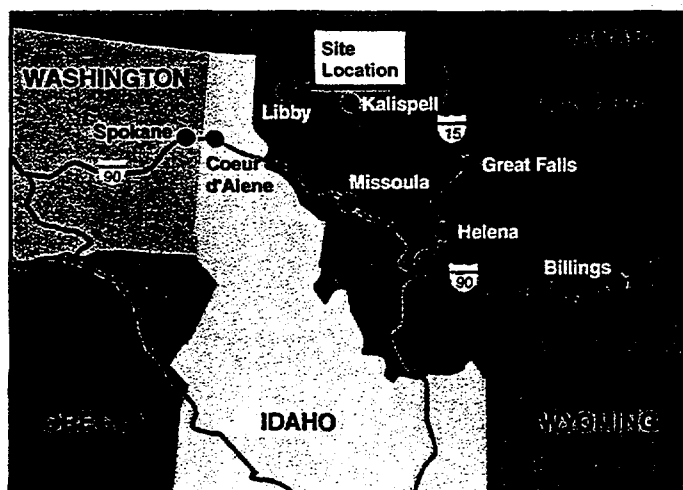
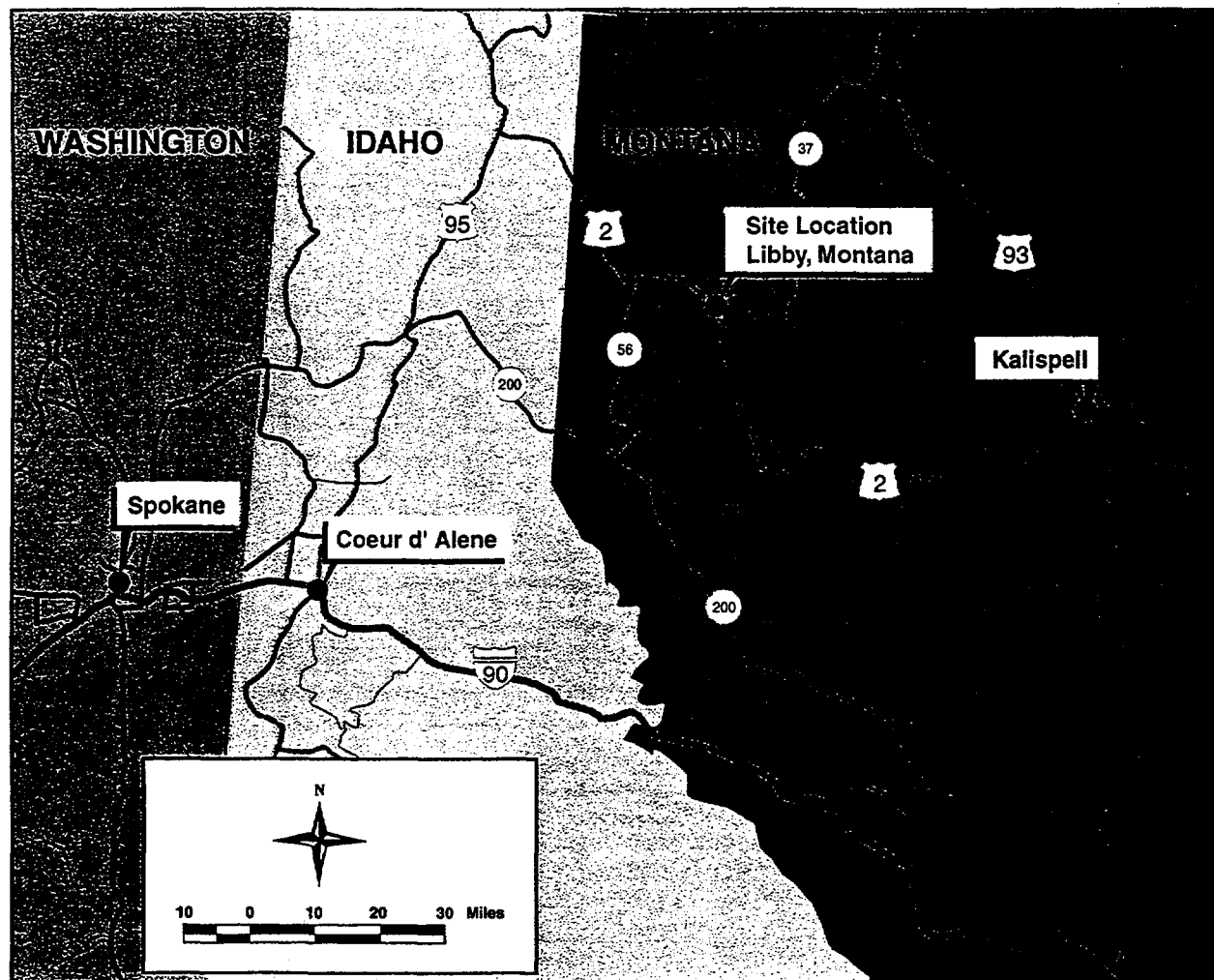
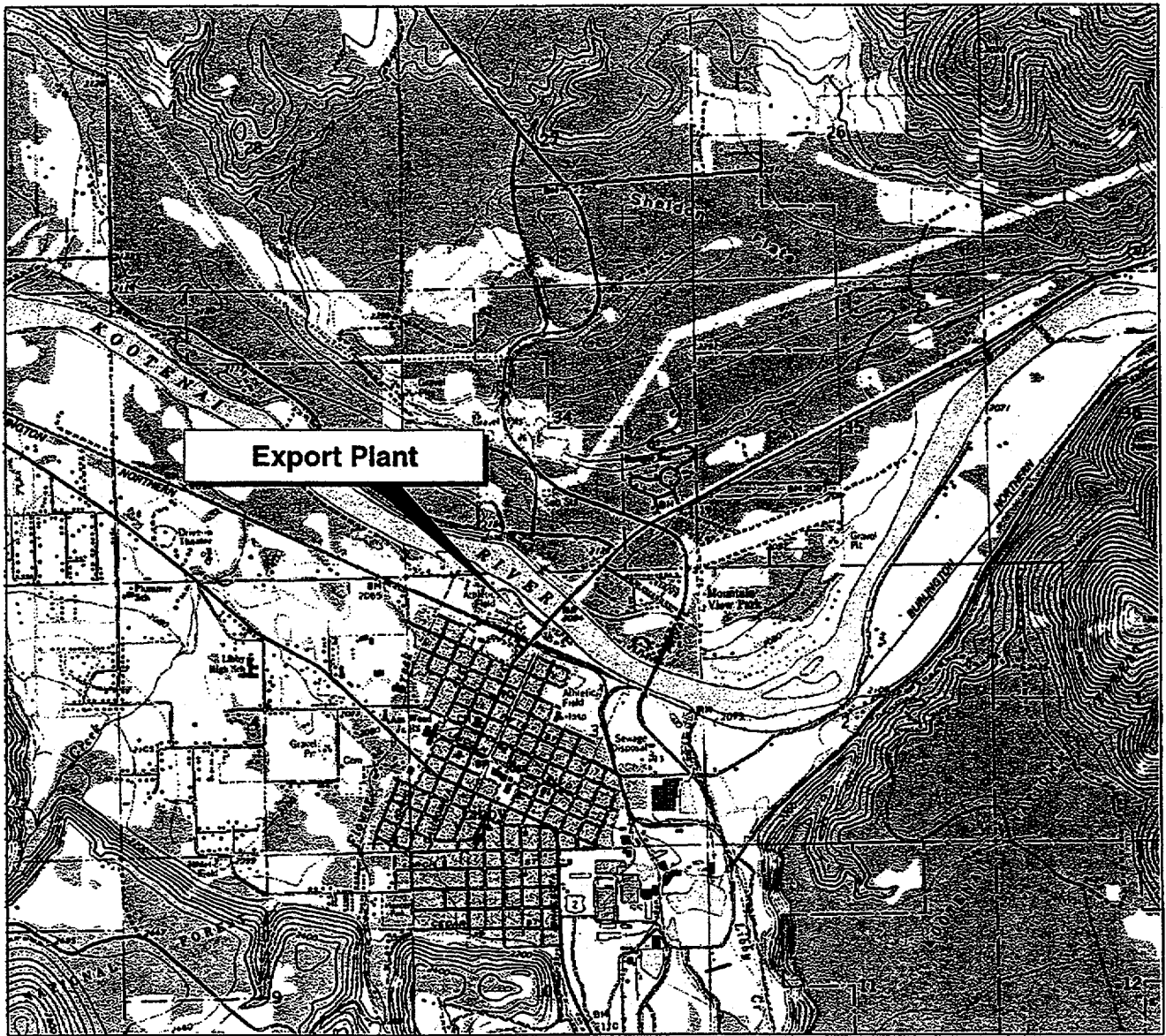


Figure 1-1
Site Locus Plan
Libby, Montana



1.2.3 Historic Usage

Operable Unit 01 was used as a vermiculite exfoliation plant and commercial export facility of mined vermiculite.

1.2.4 Operable Unit 01 Area (Acreage)

The total acreage of Operable Unit 01 is approximately 12 acres. Operable Unit 01 is accessible from Highway 37 and is located on the northern limits of the center of the Site. Operable Unit 01 is bounded on the north by the Town of Libby athletic fields, recreation area, and the Kootenai River; on the south by the Burlington Northern Railroad track bed; on the east by Highway 37; and on the west by State of Montana property. Figure 1-3 displays the general layout of Operable Unit 01.

1.2.5 General Condition of Operable Unit 01

Pole Barn

The Pole Barn, referred to as the Open Storage Building by the tenant, is a wooden frame open face structure with corrugated steel siding and roof. The corrugated metal roof appears to have been installed over an asphalt roof and has been modified with added shingles and tack. The dimensions of this structure are approximately 66 ft. by 120 ft. The structure rests on a steel reinforced concrete slab. The structural area of the Pole Barn is 7,920 sq. ft.

Old Vermiculite Storage Warehouse

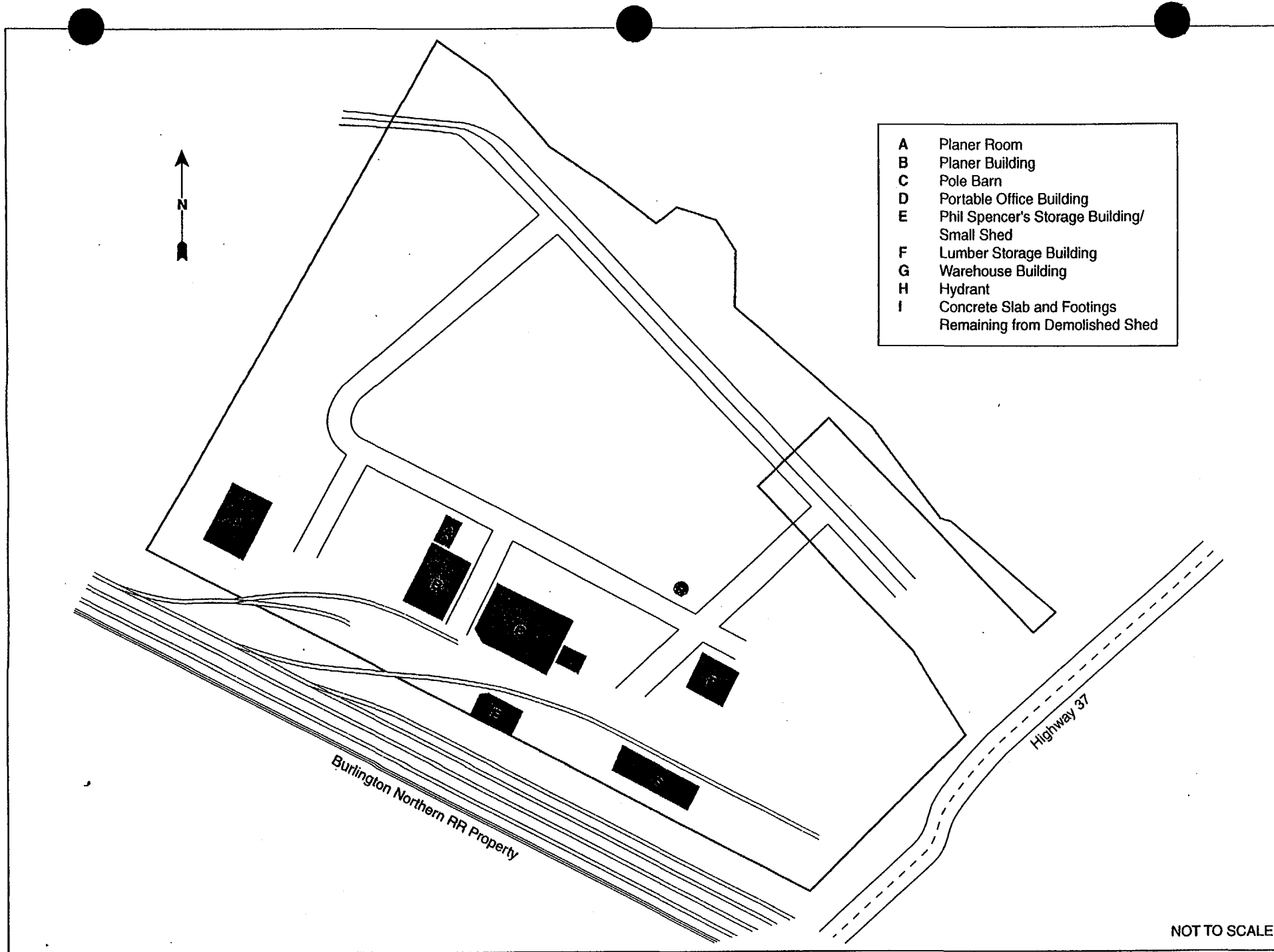
The Old Vermiculite Storage Warehouse is a wooden frame structure with wooden siding and roof covered with corrugated steel overlapping and cascading panels. This structure's dimensions are approximately 40 ft. by 100 ft. The structure was constructed onto a steel reinforced concrete slab with concrete piers supporting the beams and girders. The structural area of this building is 4,000 sq. ft.

Large Lumber Warehouse

The Large Lumber Warehouse is a wooden frame structure with corrugated metal siding on interior and exterior walls. This building is referred to by the tenant as the Garage and also houses a weight scale that is no longer in service. The roof is corrugated metal on wooden joists and trusses. The structure was constructed on a steel reinforced concrete slab. This structure's dimensions are approximately 50 ft. by 60 ft. The structural area of the Large Lumber Warehouse is 3,000 sq. ft.

Operating Planer Shop

The Operating Planer Shop is a wooden frame structure with wooden siding referred to by the tenant as the Planer Building. Attached to this building is the planer room used by the tenant for planing lumber eight to ten consecutive days per month. The roof is covered with corrugated steel overlapping and cascading panels. This structure's dimensions are approximately 70 ft. by 80 ft. The building was constructed



onto a steel reinforced concrete slab with concrete piers supporting beams. The structural area of the Operating Planer Shop is approximately 5,600 sq. ft.

Small Shed

The small shed is a wooden frame structure with wooden siding and roof. This building is leased from the Town of Libby and used for building furniture and storing assorted belongings. The roof is covered with corrugated steel overlapping and cascading panels. This structure's dimensions are approximately 36 ft. by 50 ft. The structure was built onto a steel reinforced concrete slab with a 6 ft. by 6 ft. sump that was observed to be backfilled with soil when the walkover was performed. The structural area of the small shed is approximately 1,800 sq. ft.

Demolished Shed

The demolished shed has a footprint of a steel reinforced concrete slab and footings with dimensions of approximately 30 ft. by 50 ft. The structural area of the Demolished Shed slab is approximately 1,500 sq. ft. The following is a summary of the structural building sizes:

Pole Barn	7,920 sq. ft.
Old Vermiculite Storage Warehouse	4,000 sq. ft.
Large Lumber Warehouse	3,000 sq. ft.
Operating Planer Shop	5,600 sq. ft.
Small Shed	1,800 sq. ft.
Demolished Shed	1,500 sq. ft.
STRUCTURAL AREA SUBTOTAL:	23,820 sq. ft.

These are approximate dimensions based upon available drawings. Dimensions shall be verified during the survey required under Section 2.3.2. All structures at Operable Unit 01 are in poor to fair condition.

1.2.6 Soil Conditions

Operable Unit 01 has had crushed aggregate base materials placed and compacted onto access roads and parking lots to provide adequate base during wet weather conditions.

1.2.7 Existing Infrastructure and Utilities

Access roads, telephone, water, sewage or septic disposal system, and electrical power are available at Operable Unit 01.

1.2.8 Existing Vegetation

There is no vegetation at the lumber yard portion of Operable Unit 01. Vegetation in Operable Unit 01 is limited to the baseball fields located on the northwest half of the property where grass and a few trees grow.

1.2.9 Availability of Water

Water is available to Operable Unit 01 through hose bibs and a fire hydrant.

1.2.10 Surrounding Properties

Operable Unit 01 is bordered on the south by the Burlington Northern Railroad and town-owned property to the north. State property is located to the west of Operable Unit 01 and Highway 37 is located to the east of Operable Unit 01. Adjacent properties and features will be determined by the survey required under Section 2.3.2 of this SOW.

Section 2

Removal Action Scope of Work

Respondent is required to perform the tasks outline in Section 2.1 through 2.17. In accordance with the Unilateral Administrative Order (UAO), the Respondent shall submit to EPA for review and approval a comprehensive Work Plan that describes how these tasks will be accomplished.

2.1 Temporary Re-location of Business

Operable Unit 01 is used as a fully operational lumberyard and building materials supplier. A large planer is used to finish rough cut lumber prior to bundling and shipping out by rail or truck or for sale at the lumberyard. The current business, except for the planer, shall be temporarily relocated to an appropriate commercial location in Libby. The location must be agreed to by the EPA, the City, and the current tenants. Expenses to be covered include: moving expenses (both before and after the removal), rent in excess of the tenant's current payment, and other costs in accordance with the temporary relocation requirements of 44 CFR § 220.

Respondent shall retain a certified appraiser to determine values of real and personal property affected by the removal action and use such appraisal to pay appropriate compensation to the owner and lessee of the Export Plant for temporary relocation and property restoration. Any payments shall be in accordance with the temporary relocation requirements of 44 CFR § 220.

Lumber and building materials stored at Operable Unit 01 may be contaminated with asbestos fibers and may need to be cleaned prior to reuse. Alternatively, the material may be disposed of as asbestos containing material and replaced or fairly compensated.

The tenant requested that the planer be kept in operation certain times during the removal action. The Respondent shall include plans to isolate the planer during the removal action to accommodate this requirement.

2.2 Project Execution Plans

Prior to initiation of removal action activities, the Respondent will be required to submit, at a minimum, the following plans for review and approval by the EPA. (These plans shall be incorporated into the overall Work Plan required for this Removal Action and submitted concurrently with the Work Plan):

- Traffic control plan
- Dust control plan (for both the OU 1 property and the former mine site, if used for disposal)

- Erosion control plan
- Building Decontamination Feasibility Plan (Respondent shall analyze the likely effectiveness and cost of complete decontamination as compared to the demolition and replacement of each building). EPA will use this information to decide whether a building can be adequately decontaminated in place or must be demolished to effectively remove contamination.
- Building Decontamination Plan (Plan shall address both the gross decontamination required for the buildings to be demolished and the final decontamination for buildings to be left in place).
- Equipment & Personnel decontamination plan (including plans for decontamination water collection and recycling) (See Section 2.3.6 for more detail)
- Site Control Plan (to identify work zones and restrict access)
- Health & Safety Plan (see Section 2.3.4 for more detail)
- Appraisal and Personal Property Valuation Plan
- Disposal Site Closure and Institutional Control Plan (if the former mine site is used for disposal).

2.3 Pre-Excavation & Planning Activities

The following work elements shall be performed prior to initiation of the removal action in order to provide the information to effectively manage, control, and document removal and demolition activities at Operable Unit 01.

2.3.1 Test Pit Program

The tenant has commented that vermiculite containing soils were used historically to fill in low areas of Operable Unit 01. It is believed that vermiculite containing soils could be covered with granular soils and roadways at a number of locations on Operable Unit 01. However, the exact locations where these soils may be located, or at what depth is unknown. A test pit/soil boring program shall be planned and executed on Operable Unit 01 to explore this matter.

The locations and depths of these filled areas should be determined in order to focus necessary soil removal activities. The Respondent shall develop specifications and a schedule for conducting a test pit excavation program at Operable Unit 01 and include these in the Work Plan. The test pit excavation program will be conducted once the detailed survey of Operable Unit 01 has been received, reviewed, and accepted by EPA. The current lessee of Operable Unit 01 will be requested to participate by identifying known or suspect locations of underground structures and vermiculite.

2.3.2 Conduct Land Survey

A detailed property line survey and topographic survey shall be prepared for Operable Unit 01 by a registered land surveyor licensed in the State of Montana prior to initiation of removal action activities. All physical features and structures on Operable Unit 01 will need to be located on the survey. Information obtained from Operable Unit 01 surveys will be in both reproducible hard copy and AutoCAD electronic format. The surveys will be used to establish air monitoring locations, limits of work areas, confirm existing building locations and dimensions, identify adjacent features and properties, and to prepare a grading plan.

2.3.3 Inventory and Removal of Property Contents

An inventory of items belonging to the tenant shall be conducted by the Respondents. EPA will provide photo documentation in support of this effort. A detailed asbestos survey and sampling of items stored on the property could be extremely costly and time consuming. As an alternative to sampling, articles stored in the buildings may be assumed to be contaminated with asbestos. Items will be placed into the following three categories:

- No value - The owner agrees that these items have no value and does not want any replacement. These items shall be disposed of as asbestos containing material at the former mine site or off-Site in accordance with State and Federal law.
- Of value to the owner and can be decontaminated - These articles shall be thoroughly decontaminated by washing followed by visual inspection prior to their relocation. The requirements for decontamination and certification of visual inspection are described in subsequent sections of this SOW.
- Of value to the owner, however, not compatible with standard decontamination procedures and more economical to dispose - These items shall either be replaced or the owner shall be provided with fair replacement value compensation. The original item shall be disposed of as asbestos containing material at the former mine site or off-Site in accordance with State and Federal law.

2.3.4 Prepare Health and Safety Plan

The Respondent will be responsible for developing and implementing a Health and Safety Plan for all removal actions and demolition activities at Operable Unit 01. The Health and Safety Plan will be developed and implemented in accordance with the U.S. Occupational Safety and Health Administration (OSHA) Standard 29 CFR Part 1910 and Part 1926, Occupational Safety and Health Standard for the Construction Industry and all relevant Federal and State OSHA Health and Safety requirements.

The Health and Safety Plan will be reviewed and approved by a Certified Industrial Hygienist (CIH) prior to initiating removal actions. All modifications to the Health and Safety Plan that are required during the removal action at Operable Unit 01 will

also be reviewed and approved by the project CIH prior to being implemented. The Health and Safety Plan shall address the following:

- Overview of the potential hazards of the work
- Identification of safe work practices
- Training and medical monitoring requirements
- Personal protective equipment requirements
- Personnel air monitoring
- Communication and emergency notification procedures
- Project documentation

Once the Health and Safety Plan has been approved by the CIH, the Respondent will review the plan with all removal action personnel. All removal actions at Operable Unit 01 will be conducted in strict accordance with the approved Health and Safety Plan.

2.3.4 Construction Quality Control and Quality Assurance Plan

The Respondent shall develop a Quality Control and Quality Assurance Plan that meets the requirements set forth in the Unilateral Administrative Order.

2.3.5 Prepare Air Monitoring Requirements

Air monitoring shall be conducted to determine airborne dust and asbestos fiber levels during the removal actions. Perimeter air monitoring shall be performed by an air monitoring firm hired by the Respondent (independent from the Respondent and the Respondent's removal action contractor). Air monitoring will be performed prior to the initiation of removal actions to determine background levels of dust and fibers in the air. Air monitoring will be performed during removal actions and demolition activities to ensure that dust and fibers are not being released from the work areas during removal actions, to determine the appropriate level of respiratory protection for removal action workers, and to document dust and fiber levels following the removal actions.

Air monitoring will be performed using continuous aerosol monitors and by collecting samples for analysis by transmission electron microscopy (TEM). The MIE DataRAM™ Portable Real Time Aerosol Monitor (or equivalent) will be used to conduct continuous air monitoring on the perimeter of Operable Unit 01 to determine the total mass of airborne dust and fibers (expressed as micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of air). Air samples that will be analyzed by TEM will be collected in accordance with EPA's Sampling and Quality Assurance Project Plan dated January 4, 2000 (see Appendix B for the text portion of this document). Air samples shall be analyzed in accordance with ISO 10312 counting rules unless otherwise specified by

EPA. Sample results analyzed by TEM will be expressed as asbestos structures per cubic centimeter.

Background Air Samples

The air monitoring consulting firm will collect background air samples at Operable Unit 01 to determine background airborne asbestos fiber levels prior to the start of the removal action. The consulting firm will collect air samples for TEM analysis at identical locations on Operable Unit 01 on two different days to determine background airborne asbestos fiber levels. The background air samples will be compared to the final clearance air samples to ensure that airborne asbestos fiber levels at the completion of the removal action are equal to or lower than the asbestos fiber levels present prior to initiating the removal action. Sample results shall be reported to EPA during site mobilization.

Ambient Daily Air Monitoring

The air monitoring firm will conduct daily air monitoring during the removal action at Operable Unit 01 to ensure that airborne dust and fibers are not being released during the removal action. The air monitoring firm will collect air samples along the perimeter of the Operable Unit 01, in clean rooms, and at the exhaust of negative air machines during the active work day. Sample results shall be reported to EPA within 24 hours of collection.

The air monitoring firm will place a minimum of six MIE DataRAM™ Portable Real Time Aerosol Monitors along fixed locations along the perimeter of Operable Unit 01. The DataRAMs will provide continuous monitoring of the total mass of airborne particulates on Operable Unit 01's perimeter. The air monitoring firm will also collect air samples for TEM analysis at these same fixed locations on the perimeter of the project to determine the concentration of airborne asbestos fibers. The air monitoring firm will analyze the data collected from the DataRAM and the TEM analyses to establish trends between airborne particulate levels and asbestos levels. After review of Respondent's initial data submittals, EPA will determine if an adequate correlation exists between total particulate and asbestos concentrations. EPA will determine whether total particulate measurements can be substituted for asbestos TEM analysis.

Air monitoring points shall also be established at the boundary of any exclusion zone to ensure the adequacy of the boundary. The air monitoring firm shall designate these locations as part of the Health & Safety Plan.

The air monitoring firm will also collect air samples in the clean rooms of decontamination chambers, at the exhaust of negative air machines, and other appropriate areas on Operable Unit 01. The purpose of these samples is to document that clean rooms are actually clean and that the negative air machines are not exhausting asbestos fibers. For all ambient samples collected pursuant to this section sample results shall be reported to EPA within 24 hours of collection.

Health & Safety Air Samples

The Respondent will collect daily personal air samples on its workers to document compliance with the Occupational Safety and Health Administration's (OSHA) Asbestos Standard for the Construction Industry (29 CFR Part 1926.1101).

The Respondent will collect time-weighted average (TWA) and excursion samples from ten percent (or a minimum of two) of the workers each day removal action work is performed. The TWA samples will be started at the beginning of each work day and will be turned off at the conclusion of each work day. TWAs will be adjusted using the Brief and Scala Method for workdays that last longer than eight hours. Thirty-minute excursion samples will be collected from workers during work activities that are expected to generate the highest fiber levels.

The results of the TWA and excursion samples will be compared to the Asbestos in Construction Standard to determine if the level of respiratory protection worn by removal action workers is adequate.

Ambient Final Clearance Air Samples

After each building or structure on Operable Unit 01 has been decontaminated, the air monitoring firm will perform a detailed visual inspection of the building or structure to ensure that vermiculite and dust have been adequately removed (e.g., sufficient removal so as not to generate visible dust during building dismantling). This inspection shall be performed by an asbestos inspector accredited in the State of Maontan, shall be documented in writing, and signed by the individual performing the inspection. For all buildings that will be demolished, final clearance air samples are not required prior to demolishing the building or structure. For these buildings, once a building passes the final visual inspection by the Respondent and the EPA, the building can be dismantled.

For buildings that EPA decides may be decontaminated and left in place, final clearance samples must be collected in accordance with the ARARs attached to the Action Memorandum. Sample results shall be reported to EPA within 1 week of completion of the decontamination.

At the conclusion of the removal action for Operable Unit 01, the air monitoring firm will collect final clearance samples. The air samples will be collected and analyzed by TEM. The samples will be collected at the same locations as the background samples collected prior to the initiation of the removal action. These samples will be compared to the background air samples to ensure that airborne asbestos fiber levels at the completion of the removal action are equal to or lower than the background fiber levels. Sample results shall be reported to EPA within 1 week of the removal of all contaminated material.

2.3.6 Prepare Decontamination and Dust Suppression Requirements

2.3.6.1 Decontamination Procedures

Prior to the initiation of removal actions, specific decontamination and cleaning procedures will be developed and included in the removal action Work Plan for Operable Unit 01. The Work Plan will include the requirements for decontaminating personnel, construction equipment, contents of the buildings, and the buildings themselves. The following paragraphs provide an overview of the decontamination activities to be included in the Work Plan.

2.3.6.2 Personnel Decontamination

Removal action personnel will be required to decontaminate themselves at the end of each work shift before leaving Operable Unit 01. The Respondent will furnish and install separate personnel decontamination facilities for male and female removal action workers to shower at the completion of each work shift. The decontamination facility will consist of a minimum of a clean room, shower room, and dirty room separated by air locks. The facility will have hot and cold running water, and will have a negative air system that prevents fibers from being released into the clean room. All shower water will be filtered to remove asbestos fibers before being released to the environment. Workers will enter the dirty room, remove their protective clothing, step into the shower room and shower, then enter the clean room before taking work breaks or leaving the work area for the day. The personnel decontamination facility will also be available for use by the engineer and federal and state agency personnel throughout the duration of the project.

2.3.6.3 Decontamination of Construction Equipment

A variety of construction equipment and vehicles, such as backhoes, loaders, dump trucks and bobcats, will require decontamination before leaving the job to prevent asbestos contaminated soil from being tracked off Operable Unit 01. The Respondent will be required to construct a decontamination facility at Operable Unit 01 to decontaminate equipment and vehicles. The equipment or vehicles to be decontaminated will be driven to the pad and washed with water to remove visible signs of soil and mud from the exterior of the equipment or vehicle. The water will be collected for filtration and/or disposal or reuse.

2.3.6.4 Decontamination of the Contents of the Buildings

The Respondent shall setup a separate decontamination facility at Operable Unit 01 for removal action workers to decontaminate the contents of the buildings. The removal action Work Plan will provide detailed procedures for decontaminating items that will include the use of high efficiency particulate air (HEPA) vacuum cleaners and/or rags wetted with amended water. Decontamination of these items will take place in a decontamination facility that is separate from the personnel decontamination facility.

The decontamination facility will consist of a minimum of a clean room, cleaning room, and dirty room separated by air locks. The facility will have running water, and will have a negative air system that prevents fibers from being released into the clean room. All water will be filtered to remove asbestos fibers before being released to the environment. Filtered water will be sampled and analyzed to confirm asbestos fibers have been removed. The contents of the buildings will be taken through the dirty room and handed to personnel in the cleaning room to be decontaminated. After each item is cleaned, the decontaminated item will be handed to personnel in the clean room to be taken to one of the temporary storage facilities.

2.3.6.5 Decontamination of the Buildings

Once the contents of the buildings have been removed and decontaminated, the Respondent will perform a gross decontamination of the buildings. The removal action Work Plan will provide detailed procedures for gross decontamination of the buildings that will include the use of HEPA vacuum cleaners, amended water, and/or rags and mops.

Respondent shall submit to EPA as part of the Work Plan its analysis performed in accordance with the Building Decontamination Feasibility Plan. EPA shall decide whether decontamination or demolition is appropriate for each building on Operable Unit 01.

For buildings which EPA decides shall be demolished, EPA will conduct an inspection prior to approval of demolition, and, when appropriate, require use of a spray lock down encapsulant on building surfaces to lock down any residual fibers prior to building dismantling.

For buildings which EPA decides shall be decontaminated and left in place, Respondent shall perform final decontamination and air sampling. Detailed specifications for final decontamination and clearance air sampling shall be submitted to EPA for review and approval as part of the Work Plan.

2.3.6.7 Dust Suppression Procedures

The removal action Work Plan will include dust suppression procedures to prevent asbestos contaminated dust from migrating off Operable Unit 01. Dust control will also be required on Rainy Creek Road for dust created by trucks hauling waste to the vermiculite mine, if the mine is used for disposal. The removal action Work Plan will include detailed procedures for dust suppression that will include the use of liquid magnesium chloride dispensed from water trucks and sprayers on Operable Unit 01 and on Rainy Creek Road. The independent air monitoring firm will conduct visual observations and air monitoring of Operable Unit 01 to ensure that dust suppression techniques are adequate. In the event that the EPA OSC determines that dust suppression techniques are inadequate, the Respondent shall take steps as directed by the EPA OSC to rectify the inadequacy.

2.4 Mobilization & Site Preparation

Initial mobilization for this project shall be performed in preparation for the Removal Action. Mobilization will include set up of the following temporary facilities and structures:

Office Trailer - The trailer shall have sufficient space to conduct on-site meetings with agency personnel.

Temporary Electrical Power Service - Electrical power shall be provided through the existing service and hard wired into the office trailers.

Portable Toilets - Portable toilets for male and female workers and agency personnel shall be staged in the Support Zone and workers must exit through the personnel decontamination facility in order to access these facilities. The number of toilet seats and urinals shall be in accordance with the requirements of 29 CFR 1910.120 (n)(3)(I), however, there shall be at least three portable toilets with hand washing facilities at Operable Unit 01. Portable toilets shall be emptied and cleaned, and liquids, disinfectants, paper, etc. replaced or resupplied every other day during removal action activities.

Temporary Lumber Storage Area - A temporary building shall be constructed to house items owned by the current tenant of Operable Unit 01. The building shall be in a location that is completely accessible to the Tenant at all times. The building shall be of sufficient size to accommodate all items currently on the property identified by the tenant as needing storage.

Construction Equipment Storage Area - A construction equipment storage area shall be constructed so that equipment is located in a central area when not in use.

Contaminated Materials Staging Area - A temporary holding area for asbestos contaminated debris and soil shall be constructed if the Respondent anticipates stockpiling soils prior to trucking and disposal. The area shall be constructed with a minimum of a 2 foot soil berm for spill containment. The final disposition of wastes stored in this area shall be determined as soon as possible.

Hazardous Materials Staging Area - A temporary staging area for hazardous materials such as fuel, lubricating oils, chemicals, PCB light ballasts and other hazardous and regulated materials shall be constructed on Operable Unit 01. The area shall be lined with 20 mil thick plastic and be bermed around the perimeter.

Recyclable Materials Storage Area - A recyclable materials storage area shall be established for demolition debris or salvageable items determined to be acceptable for recycling.

Personnel Decontamination Facilities - Personnel decontamination facilities shall consist of personnel showers, eyewash stations, personal protective equipment (PPE)

storage, tables, and chairs for personnel, lockers for all personnel, and a clothes washer and dryer. They shall also meet the requirements set forth in Section 2.3.6.2.

Equipment Decontamination Facilities - Equipment decontamination facilities shall be constructed with a sump on the low corner for water collection and a 20 mil plastic liner. The liner shall be covered with 1 inch clean gravel so that decon water can easily percolate through the gravel, onto the plastic and be collected in the sump. Decon water shall be for treatment, recycling or off-Site disposal.

Structural Decontamination Facilities - Structural (buildings) decontamination facilities shall consist of French drains around the perimeter of the structural slabs, and the use of booms and dikes to collect decontamination water. Plastic sheeting shall be wrapped around the exterior walls of these structures to collect overspray and mitigate dust.

2.5 Remove and Decontaminate Salvageable Inventoried Property

Inventoried items that can be decontaminated and which were determined to be of value to the property owner and lessee or which could be recycled shall be removed from each structure, passed through the decontamination facility and visually inspected. If any item is determined to require further decontamination, then the process shall be repeated until the item is certified clean. The inspection shall be performed by an asbestos inspector accredited in the State of Montana. The results of the inspection shall be documented and signed by the accredited inspector. The salvageable items shall be staged in the recyclable materials storage area and prepared for shipment or staged in a secure location to be returned to the property owner and lessee. Some items to be returned to the lessee may require relocation to the temporary business established under Section 2.1 or the temporary lumber storage area.

2.6 Remove and Dispose of Non-Salvageable Inventoried Items

Non-salvageable items (items which can not be adequately decontaminated shall be staged in the Contaminated Materials Storage Area. This material shall be disposed of as asbestos containing material at the mine site or off-Site in accordance with State and Federal law.

2.7 Gross Asbestos Contamination Removal

Asbestos containing insulation and dust that are lodged in between structural supports, metal siding, inside interior walls, and on surfaces throughout each structure shall be removed, bagged, containerized and staged in the Contaminated Materials Storage Area where it shall be prepared for transportation. Transportation and disposal shall occur when adequate quantities of the waste have been accrued to maximize transportation efficiency.

All structures are known to contain gross asbestos contamination. To facilitate demolition and disposal, if necessary, of all building components, each building will be decontaminated using high vacuum machinery with high efficiency particulate air (HEPA) filters prior to dismantling and demolition and in accordance with the approved Work Plan. All decontamination, dismantling, and demolition activities will be conducted in a manner such that no visual dust emissions are observed, in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAPS), asbestos (40 CFR Part 61, Paragraph 61.145) regulations.

2.8 Controlled Dismantling and Demolition of Structures

The structures requiring dismantling and demolition will be determined by EPA. These structures contain vermiculite that is lodged in between structural members. All concrete slabs under buildings that are to be demolished will be removed as part of this removal action. Dismantling these structures shall be accomplished under a constant water spray to mitigate and control dust. The roof of these structures shall be dismantled first, followed by the interior walls. Exterior walls shall remain in place. The Planer Room and planer shall be protected from damage throughout the removal activities.

Controlled demolition of any structure on Operable Unit 01 shall not occur until it has been established that a gross asbestos decontamination has been performed. An asbestos inspector accredited with the State of Montana and a Certified Industrial Hygienist shall perform an inspection and clearance prior to initiating the demolition process. By the time the demolition process is ready to begin, the only remaining portions of the structures shall be the supporting steel or wood frames and exterior walls. The decision regarding adequacy of gross decontamination prior to controlled demolition will be made by EPA after the Respondent's inspection. Appropriate equipment shall be used to pull down the structure while minimizing dust generation. Water spray, air monitoring and visual inspection shall be done continuously during this process to mitigate and control dust. The details of the dust control to be used during building dismantling and demolition will be included in the Dust Control Plan required under Section 2.2.

Asphalt and concrete structures and slabs shall be removed to facilitate property restoration. The asphalt and concrete shall be staged and pulverized prior to transportation and disposal.

2.9 Final Building Decontamination, Sealing & Testing

For buildings which EPA determines should be decontaminated and left in place, Respondent shall implement the plan approved by EPA pursuant to Section 2.3.6.5.

2.10 Excavation

Once all stored items on Operable Unit 01 have been removed and disposed or relocated, and buildings demolished, soil removal will begin. Prior to the excavation

of asbestos contaminated soils, Operable Unit 01 shall be cleared and grubbed of vegetation using appropriate equipment. Based on the results of surface soil sampling, 12 inches of contaminated soils will be removed from the area designated as the excavation area in Figure 2-1. The EPA has the discretion to include additional areas based on refinement of the existing sampling grid. Confirmatory soil sampling will follow the 12" excavation using PLM analysis (or other method as deemed appropriate by the EPA). If contaminated soil is confirmed by the supplemental sampling, an additional 6 inches of soil will be removed to a maximum depth of 18 inches. At the direction of the EPA, excavation will proceed to depths greater than 18 inches in the event that large quantities of exfoliated or unexfoliated vermiculite is encountered.

The soils shall be excavated under a constant water spray provided by fixed water cannon and water trucks. Dust control and suppression is a major concern and shall be continuously monitored by visual inspection and air monitoring.

2.11 Waste Loading and Transportation

All contaminated demolition debris and excavated soil will be disposed at a disposal area at the former vermiculite mine or at an off-site facility licensed to accept asbestos contaminated material and in accordance with State and Federal law. Transportation will be by tarp covered and lined trucks or by tarp covered belly dump trucks, if determined feasible once disposal sites have been selected.

All demolition debris not to be recycled including steel, wood, concrete, asphalt pavement, etc. shall be reduced to a size capable of being readily and efficiently loaded into end dump trucks and compacted at the disposal site. It is anticipated that hydraulic shears, pavement breakers/pulverizers, and other appropriate demolition equipment will be used for this purpose.

State of Montana Bills of Lading (BOL) will be prepared by the removal/demolition contractor for each truckload of waste leaving Operable Unit 01. Loading of trucks will need to be done under strict dust control procedures due to Operable Unit 01's proximity to the center of town. Truck drivers must be asbestos trained and wearing appropriate PPE during loading and unloading operations. The Respondent will be responsible for thoroughly washing down all trucks prior to their leaving Operable Unit 01. No mud will be permitted on Highway 37.

2.12 Waste Disposal

Waste materials (including asbestos containing debris, soil and other materials) will be disposed at a disposal area designated by the EPA at the former vermiculite mine or off-Site in accordance with applicable Federal and State Laws. All solid wastes disposed of at the former mine shall be deposited daily in a manner such that the area can be graded to a reasonably smooth and flat surface. Soils excavated from Operable

Figure 2-1

Unit 01 will be placed on top of the solid wastes, graded to a smooth, relatively flat surface acceptable to EPA.

2.13 Import Clean Backfill Material at Operable Unit 01

Unless otherwise determined by the EPA and the property owner the following backfill requirements shall be employed. Following removal of soil, the excavated areas of Operable Unit 01 will be covered with 12 inches of common fill and 6 inches of gravel compacted to be suitable for future asphalt paving. Areas not anticipated to be paved will be covered with 12 inches of common fill and 6 inches of topsoil and hydroseeded.

2.14 Backfill and Compact at Operable Unit 01

Backfill and compaction shall be accomplished with a smooth drum compactor for building pads, roads and parking lots, and padded drum compactor for all other surfaces. Compaction shall be to 90 percent of relative density to 3 feet below building pad grade and 95 percent less than 3 feet below building pad grade.

2.15 Grading

Finish elevations, lines and grades shall conform to the wishes of the current landowner.

2.16 Restoration

Respondent shall retain a certified appraiser to determine values of real and personal property affected by the Removal Action and use such appraisal to establish appropriate compensation to the owner and lessee of the Export Plant for property restoration. Respondent shall either restore property to the value established by this appraisal and agreed to by the property owner or pay cash compensation as agreed to by the property owner.

2.17 Closure and Institutional Controls

If the former vermiculite mine is used for disposal of material generated by this removal action, the Respondent will be responsible for establishing a plan and implementing institutional controls to protect the long-term integrity of this material. This plan shall be submitted for EPA approval along with the Work Plan. Once approved by EPA, Respondent shall implement the plan.

APPENDIX A

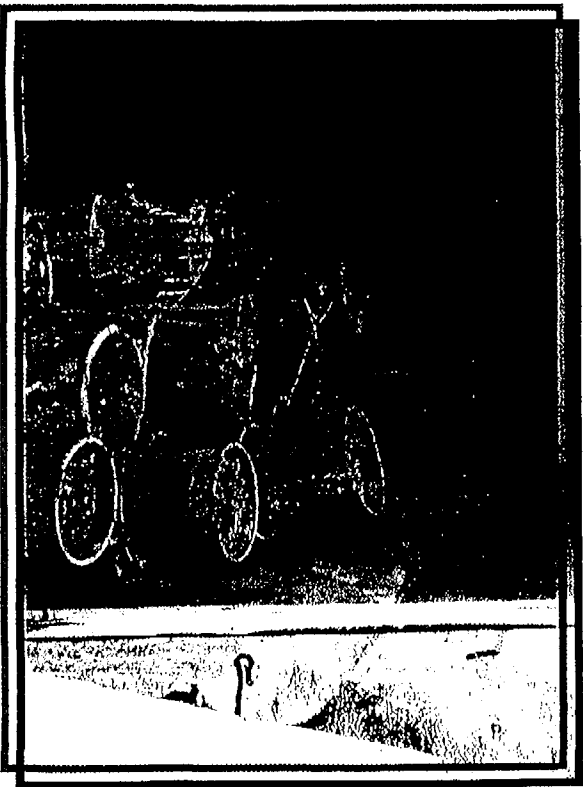
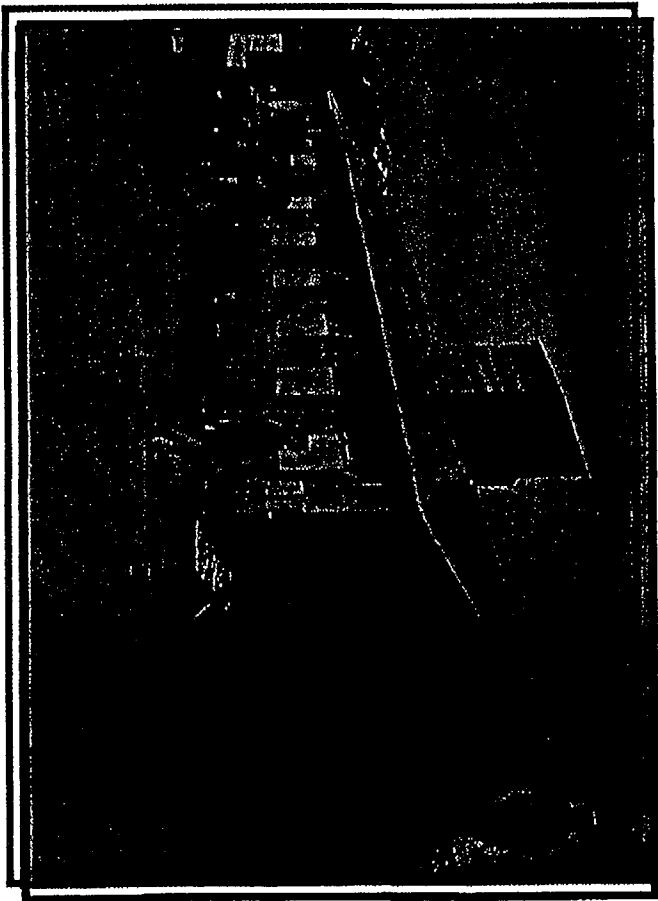
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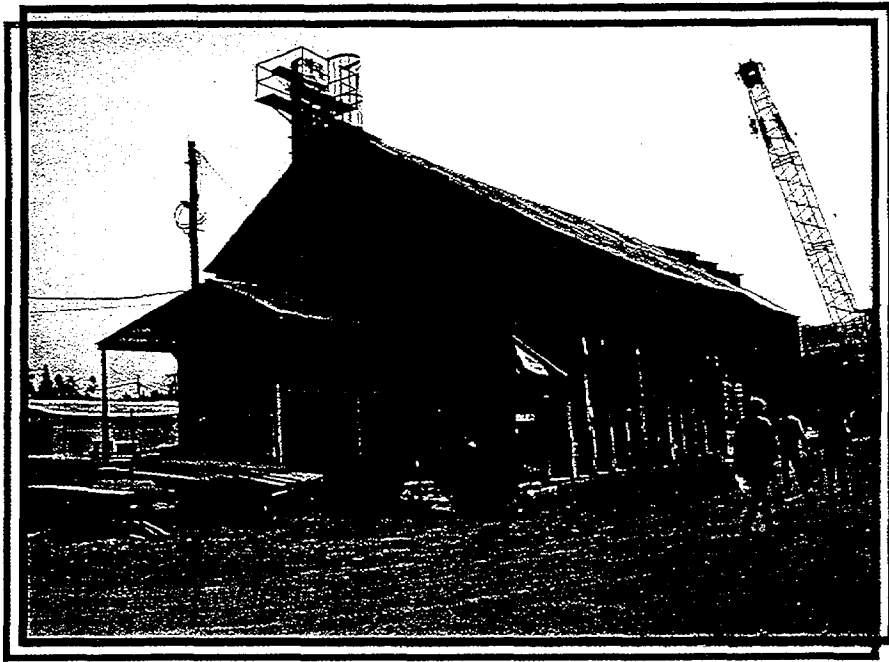
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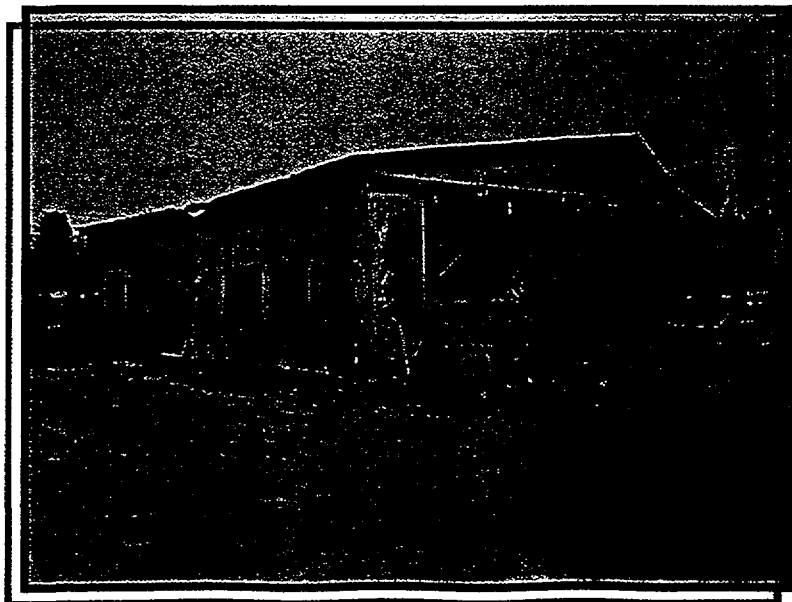
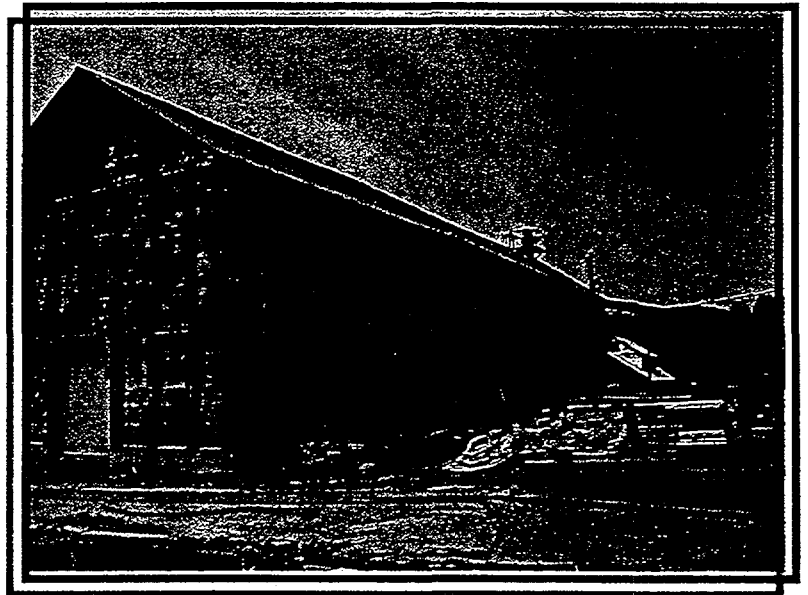
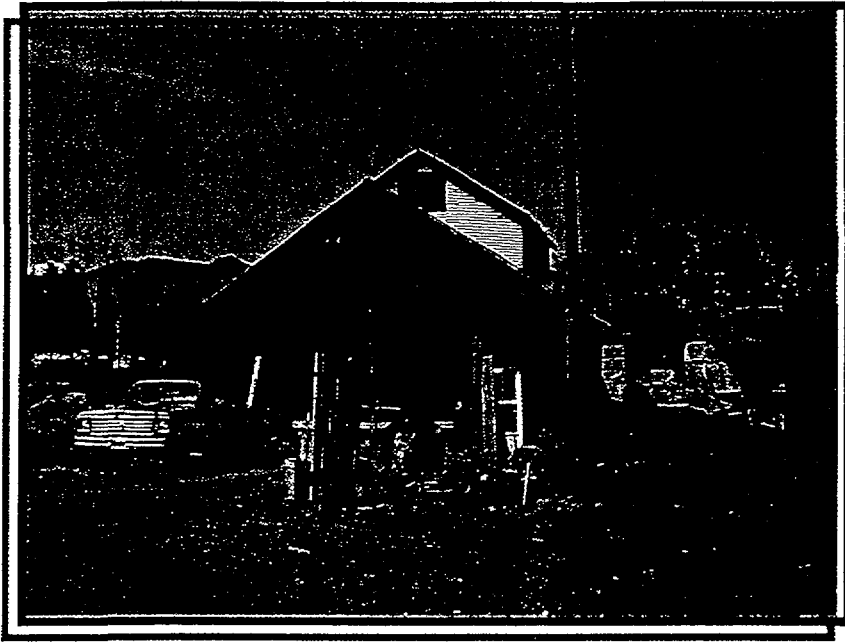
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PLANT**







APPENDIX B

TEXT PORTION OF EPA SAMPLING AND QUALITY ASSURANCE PLAN

**SAMPLING AND QUALITY ASSURANCE PROJECT PLAN
REVISION 1**

FOR

Libby, Montana

Environmental Monitoring for Asbestos

***Baseline Monitoring for Source Area and Residential Exposure
to
Tremolite-Actinolite
Asbestos Fibers***

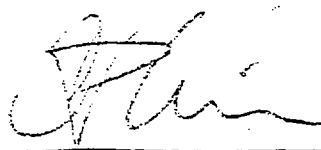


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1/4/2000

DOCUMENT REVISION LOG

Revision	Date	Major Changes
0	12/6/99	--
1	1/4/00	<ul style="list-style-type: none">a. Revised text to clarify study design and DQOsb. Added SOP for surface water to allow collection and evaluation of surface water as a transport mediumc. Added alternative SOP for asbestos analysis in soil that may have higher sensitivity than other methods.d. Added figures to help illustrate key steps from sample collection to analysise. Added final SOPs as appendices to the revision.

Table of Contents

<u>DQO#</u>	<u>DQO Element</u>	<u>page#</u>
A1	Title and Approval Page	i
A2	Table of Contents	ii
A.	PROJECT TASK ORGANIZATION	1
A3	PROJECT MANAGEMENT	1
A4	PROBLEM DEFINITION and BACKGROUND	1
A5	PROJECT TASK DESCRIPTION	3
A6	QUALITY OBJECTIVES and CRITERIA for MEASUREMENT DATA	4
B.	MEASUREMENT AND DATA ACQUISITION	19
B1	SAMPLING PROCESS DESIGN	19
B2	SAMPLING METHODS REQUIREMENTS	19
B3	SAMPLING, HANDLING AND CUSTODY REQUIREMENT	21
B4	ANALYTICAL METHODS REQUIREMENTS	22
B5	QUALITY CONTROL REQUIREMENT	23
B6	INSTRUMENT CALIBRATION and FREQUENCY	24
C.	ASSESSMENT OVERSIGHT	24
C1	ASSESSMENTS and RESPONSE ACTIONS	24
D.	DATA VALIDATION and USABILITY	25
D1	DATA REVIEW, VALIDATION and VERIFICATION REQUIREMENTS	25
D2	VALIDATION and VERIFICATION METHODS	26
D3	RECONCILIATION with DQOs	26
	REFERENCES	32
E.	APPENDICES	33

A. PROJECT TASK ORGANIZATION

A3 PROJECT MANAGEMENT

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A4 PROBLEM DEFINITION and BACKGROUND

Problem: This sampling plan has been developed in response to requests from the State of Montana, Lincoln County Health Board (meeting minutes, 11/23/99), and City officials of Libby, MT, to address questions and concerns raised by citizens of Libby regarding possible ongoing exposures to asbestos fibers as a result of historical mining, processing and exportation of asbestos-containing vermiculite. Over 60 years of mining, milling, packaging and shipping of vermiculite at the mine and associated properties resulted in the environmental release of asbestos fibers during mining operations (McDonald et al., 1986; Amandus et al., 1987; Amandus and Wheeler; 1987; Amandus et al., 1978). Since closure of the mine in 1990, it is expected that production-related emissions have been greatly reduced or eliminated.

However, there are presently insufficient data to conclude that current exposures to residents in Libby and the surrounding area and occasional recreational visitors to the former mining areas are negligible. ***The purpose of this sampling effort is to acquire information suitable for supporting an exposure and risk assessment for current environmental conditions in Libby.***

Background: Asbestos is a generic term for a group of six naturally-occurring, fibrous silicate minerals that have been widely used in commercial products. Asbestos minerals fall into two groups or classes: serpentine asbestos and amphibole asbestos. Serpentine asbestos, which includes the mineral chrysotile, a magnesium silicate mineral, possesses relatively long and flexible crystalline fibers that are capable of being woven. Amphibole asbestos, which includes the minerals amosite, crocidolite, tremolite, anthophyllite, and actinolite, form crystalline fibers that are substantially more brittle than serpentine asbestos.

Asbestos is of potential health concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in air can result in lung disease such as asbestosis, mesothelioma, and lung cancer. Figure 1 presents a preliminary Site Conceptual Model which identifies exposure pathways by which asbestos fibers from mining-related sources might become entrained in air in Libby, leading to inhalation exposures of residents or workers. The site conceptual model will be refined as site data are acquired and an improved understanding of actual transport and exposure pathways is achieved.

Approach: This sampling plan describes the efforts planned by EPA to monitor and characterize asbestos-containing materials in and about the vicinity of Libby. The plan will be composed of two phases:

Phase 1: This is a rapid pilot-scale investigation that has two main objectives:

- a) Obtain information on airborne asbestos levels in Libby in order to judge whether a time-critical intervention is needed to protect public health.
- b) Obtain data on asbestos levels in potential source materials, and identify the most appropriate analytical methods to screen and quantify asbestos in source materials.

Phase 2: This will consist of a systematic evaluation of asbestos levels in air in Libby and in appropriate background locations, along with a systematic investigation to identify the actual or potential source(s) and release mechanism(s) of asbestos in Libby and the surrounding area. The implementation, pace and scope of Phase 2 and the methods used to collect and analyze samples in Phase 2 will be determined in large part by the results of the Phase 1 pilot study.

Interpretation. Analyses of asbestos fibers in air and other site media will determine the potential (or lack of potential) for human inhalation exposure under **present** conditions. The environmental fate and transport of asbestos fibers may be such that present measurement conditions (e.g. weather) and/or measurement techniques interfere with the ability to identify

and/or quantify asbestos fibers in relevant exposure media (soil, dust, air, or water). Thus, while conclusions drawn from the implementation of this study are applicable to the present conditions at the site, they do not necessarily reflect conditions which may develop in the future.

A5 PROJECT TASK DESCRIPTION

To the extent possible, sampling will be conducted such that data will be meaningful for human exposure and risk assessment. Because the chief exposure pathway is air, emphasis will be placed on collection of air samples. In addition, to help identify potential sources and transport pathways for asbestos, samples of various bulk materials (mine waste, soil, dust, water, sediment) will also be collected in residential and non-residential areas.

Phase 1

Basic tasks needed to complete Phase 1 are listed below:

1. Collect samples of air, soil, dust, water, and insulation from selected locations in and around town, including a number of residential and/or commercial locations, as well as suspected source areas such as historical mining/processing/loading facilities.
2. Perform asbestos analyses on all air samples and a selected set of the dust, soil, insulation and water samples (those judged to be most likely to have either "high" or "low" concentrations) in order to obtain preliminary information on asbestos levels in air and other media, and to identify the optimum conditions for collection and analysis of bulk media.

At this time, the proposed sampling for Phase 1 consists of collection of environmental media from approximately 30 residences and 3 potential source areas. Residential sample locations will be selected from residences volunteering for multimedia sampling. In addition to the collection of samples within the residential area, samples may also be collected in commercial warehouses, agricultural buildings, or businesses in Libby, as needed to support the objectives of the On Scene Coordinator. Potential source area samples will be collected along the mine road (Rainy Creek Road) and at the Former Vermiculite Loading facility near the intersection of Rainy Creek Road and Highway 37.

Media samples will be collected according to Standard Operating Procedures provided by CDM, Inc. or as provided in the attachments to this Sampling and Quality Assurance Plan.

Phase 2

The purpose of Phase 2 is to design and implement a systematic program of sample collection and analysis to fully characterize levels of health risk from long-term inhalation

exposure to asbestos in air, and to identify any actual or potential sources and release mechanisms of asbestos. Specific tasks needed to implement Phase 2 will be selected after completion of Phase 1.

A6 QUALITY OBJECTIVES and CRITERIA for MEASUREMENT DATA

Two types of objectives are identified in this quality assurance project plan (QAPP): general objectives and data quality objectives (DQOs). General objectives are statements of practical goals that, if realized, will substantially contribute to achieving the purpose of the study. Development of DQOs is a process that is intended to ensure that task objectives are clearly defined and that data collected are appropriate and of sufficient quality to satisfy the objectives.

Phase 1 General Objective 1

Determine whether current airborne levels of asbestos in Libby are high enough to warrant a time-critical intervention.

Phase 1 General Objective 2

Obtain preliminary data on asbestos concentrations in potential source materials for air (e.g., dust, soil, mine waste), and determine the optimum conditions for sampling and quantifying asbestos levels in source materials.

Phase 2 General Objective

The general objectives for Phase 2 is to collect reliable and systematic data on asbestos levels in air and other media in Libby to allow a reliable evaluation of current human exposure and health risk from asbestos as well as an identification of sources of unacceptable levels of asbestos in air.

Data Quality Objective Process

The DQO process can be an iterative process which is designed to focus on the decisions that must be made and to help ensure that the site activities that acquire data are logical, scientifically defensible, and cost effective. The DQO process is intended to:

- b Ensure that task objectives are clearly defined
- b Determine anticipated uses of the data
- b Determine what environmental data are necessary to meet these objectives
- b Ensure that the data collected are of adequate quantity and quality for the intended use

The three stages of the DQO process are identified below and a discussion of how they

have been applied in the characterization study described herein. The three stages are undertaken in an interactive and iterative manner, whereby all the DQO elements are continually reviewed and re-evaluated until there is reasonable assurance that suitable data for decision making will be attained.

- Stage I - Identify Decision Types: Stage I defines the types of decisions that will be made by identifying data uses, evaluating available data, developing a conceptual model, and specifying objectives for the project. The conceptual model facilitates identification of decisions that may be made, the end use of the data collected, and the potential deficiencies in the existing information.
- Stage II - Identify Data Uses/Needs: Stage II stipulates criteria for determining data adequacy. This stage involves specifying the quantity and quality of data necessary to meet the Stage I objectives. EPA's Data Usability for Risk Assessment Guidance (DURA) outlines general and specific recommendations for data adequacy. This includes identification of data uses and data types, and identification of data quality and quantity needs.
- Stage III - Design Data Collection Program: Stage III specifies the methods by which data of acceptable quality and quantity will be obtained to make decisions. This information is provided in the SOP.

Through utilization of the DQO process, as defined in EPA guidance (EPA540-R-93-071 and -078, Sep 1993), this QAPP will use several terms that are specifically defined to avoid confusion that might result from any misunderstanding of their use. For each of the tasks identified within this QAPP, a "Task Objective" is specifically defined. The Task Objective is a concise statement of the problem to be addressed by activities under this task. For each Task Objective, a decision (or series of decisions) is identified which addresses the problem contained in the Task Objective.

For each decision, the data necessary to make the decision are identified and described. For all analytical data, quality assurance objectives are specified that describe the minimum quality of data necessary to support the specified decision or test the hypotheses. These quality assurance objectives are specified as objectives for precision, accuracy, representativeness, comparability, and completeness. In addition, data review and validation procedures are specified in the QAPP that evaluate how well the analytical data meet these quality assurance objectives and whether or not the data are of sufficient quality for the intended usage.

The following sections apply the DQO process to the Libby Project, Stage I and Stage II. Stage III is discussed later (see Section B), but sampling and analysis methods presented in this section are considered tentative and final decisions on optimum sampling and analytical methods will be delayed until the findings of Phase 1 are available.

DQO Stage I - Identifying Decision Types

Stage I of the DQO process identifies a primary question and secondary questions that

need to be resolved at the completion of the sampling and analyses program.

- b PRIMARY QUESTION (Phase 1): Are current airborne levels of asbestos sufficiently high to warrant a time-critical intervention?
- b SECONDARY QUESTION (Phase 1): What are the most likely sources of asbestos in air, and what are the best methods for quantifying asbestos levels in potential source materials?

DQO Stage II - Identifying Data Uses/Needs

Stage II of the DQO process also determines what type and quality of data are needed to answer the questions developed in Stage I. EPA has developed a seven-step method for developing the DQOs. This seven-step method is applied below in order to define the data requirements needed to achieve the primary and secondary objectives of the Phase 1 evaluation (and summarized in Table 1).

Primary Objective: Evaluate The Need For Time-critical Action

1. State the Problem

The problem to be addressed by this study is that citizens of Libby appear to have an increased incidence of asbestos-related disease, but there are no data to determine if this disease is attributable solely to historic exposures, or whether current exposures are of continuing health concern.

2. Identify the Decision

The first decision to be made is whether or not time-critical intervention is needed to protect public health. If current exposures are not high enough to warrant time-critical intervention, the next decision is whether or not non-time-critical remedial action is needed.

3. Identify Inputs to the Decision

Decisions on the need for time-critical intervention or non-time-critical remediation will be based on estimated risk of lung disease in current residents and workers in Libby. Two types of lung disease are of concern: asbestosis (a non-cancer effect) and lung cancer and mesothelioma (cancer effects). Limited data suggest that chronic exposures to chrysotile fiber levels of 5-20 f/mL can cause asbestotic changes (ATSDR 1999), but data are not sufficient to derive a reliable chronic MRL or RfC for asbestosis. However, methods have been established for estimating the excess risk of lung cancer and/or mesothelioma, and it is considered likely that exposure levels that protect against unacceptable risk of lung cancer/mesothelioma (in the

range of 0.1 to 0.0001 f/mL; see below) will also protect against unacceptable risk of asbestosis.

The basic equation used to estimate cancer risk is:

$$\text{Risk} = \text{Concentration (f/mL)} * \text{Unit Risk (risk per f/mL)}$$

Thus, the data needs are an **estimate of airborne asbestos concentration** and an **estimate of cancer risk per unit concentration**.

Measurement of Asbestos Concentration in Air

There are a number of techniques for measuring asbestos fibers in air, all of which are based on visual identification of structures as asbestos fibers. Most historical human health data and many regulatory limits for asbestos exposure in air are based upon asbestos fiber concentrations measured using phase contrast microscopy (PCM) (see Table 2). In this method, **fiber material** is defined as having a length >5 microns and an aspect ratio (length to diameter ratio) of three or more. Results are generally reported as fibers per milliliter of air (f/mL).

More recently, a number of other methods have been developed for quantitative or qualitative measurement of asbestos fibers in air, including transmission electron microscopy (TEM), and x-ray diffraction (XRD). These methods are generally more sensitive than PCM, and also allow visualization and quantification of asbestos fibers that are thinner than those visible under PCM. This is important because it is likely that the toxicity of long thin fibers is greater than that of shorter thicker fibers (Berman et al., 1995). Based on this, **asbestos fibers in air will be quantified by TEM**. Detailed rules for identifying asbestos fibers of biological concern by TEM are provided in ISO method 10312. This method is an international standard procedure that is recommended for quantifying asbestos fibers that are believed to be the chief source of human health concern (Berman and Crump 1999).

Unit Risk for Asbestos in Air

It is mandatory that the unit risk value used to calculate cancer risk be based on the same type of asbestos measurement technique as used to quantify asbestos concentration in air. That is, it is not correct to estimate risk by multiplying a concentration based on TEM fibers per mL by a unit risk based on PCM fibers per mL. Thus, risk-based values shown in Table 2 cannot be used to interpret measurements based on TEM. EPA has developed a model for predicting risk from mesothelioma and lung cancer from TEM-based measurements of asbestos in air (USEPA 1986), and this method has been revised and improved by Berman and Crump (1999) to incorporate the influence of fiber length. The risk factors for the modified mesothelioma and lung cancer model are summarized in Table 3. Note that the risk factor depends not only on the number of TEM fibers greater than 5 um in length, but also on the

fraction of all fibers that are longer than 10 μm .

The toxicity factors shown in Table 3 are based on the best data currently available, but it is important to recognize that these toxicity factors are uncertain. This is because the values are derived from studies in which important details of exposure (level, duration, fiber size distribution, etc.) are not always known. In particular, the importance of fiber size (length, thickness) and fiber type (tremolite, chrysotile, etc.) on toxicity is difficult to quantify and remains a source of discussion.

4. Define the Study Boundaries

Spatial Bounds

The spatial bounds to be investigated in this project include the community of Libby, and areas associated with former mining activities near the town. Appropriate background areas may be selected for comparative evaluation.

Temporal Bounds

Asbestos fibers enter air mainly as a result of resuspension due to mechanical disturbance or wind erosion. Because mechanical and wind forces may vary substantially over time, asbestos levels in air are also expected to vary substantially over time. Thus, estimates of long term average concentrations are inherently preferable to measurements based on grab samples. Therefore, multiple samples of air will be collected over time at locations of interest. It is likely the highest levels will tend to occur in summer, when source areas tend to be dry and wind and mechanical forces result in significant dust resuspension.

5. Develop a Decision Rule

EPA must identify an actual or potential threat to human health or the environment in order to initiate a time-critical intervention at a site. Based on current EPA guidelines, a lifetime excess cancer risk of $1\text{E-}04$ is considered to be at the upper end of the acceptable risk range for chronic (lifetime) exposure. Based on this, this Phase 1 study will use an excess cancer risk of about $1\text{E-}03$ as the appropriate boundary for decision-making. That is, if asbestos levels in air correspond to an estimated cancer risk of about $1\text{E-}03$ or higher, time critical actions to identify sources and find appropriate and effective interventions will be considered. If estimated cancer risks from asbestos in Phase 1 air samples do not exceed a level of about $1\text{E-}03$, then further studies may be pursued to determine if risk levels might exceed $1\text{E-}03$ at other times or in other places, or if risks might exceed an acceptable chronic risk level (e.g., $1\text{E-}04$).

6. Specify Limits on Decision Errors

The null hypothesis that will be tested in Phase 1 is that indoor air levels in Libby are sufficiently high to warrant time-critical intervention. Two types of decision error are possible

when making this decision:

Type I Error: Rejecting the null hypothesis when it really is true. That is, the site is declared to be below a risk level of $1E-03$ when it is really above this level.

Type II Error: Accepting the null hypothesis when it actually is false. That is, the site is declared to be of time-critical concern when it actually is not.

The limits on these two types of errors are risk management judgements. In order to minimize the chances of a Type 1 error (a "false negative"), the decision will be based on the highest concentration of asbestos fibers detected in any currently-occupied residential or occupational building evaluated in the Phase 1 investigation. If one or more samples exceeds the $1E-03$ risk level, time critical action may be needed. However, additional samples may be collected to confirm the original measurement and to refine the risk estimate. Because of the time variability in asbestos levels in air, final decisions may be delayed until additional data have been collected, including data in the summer when airborne resuspension and transport of asbestos fibers in outdoor air is considered to be more likely than in winter.

7. Optimize the Design for Obtaining Results

Additional indoor and/or outdoor air samples may be collected and incorporated into either Phase 1 and/or Phase 2 as data become available on actual airborne exposure and risk levels.

Secondary Objective: Preliminary Investigation of Source Materials

Table 4 provides a summary of the seven-step DQO process for achieving the secondary objective. The following text describes each of the DQO steps in detail.

1. State the Problem

The problem to be addressed by this portion of the study is that most methods currently available for measuring asbestos in solid materials (e.g., soil, dust, bulk insulation, mine waste, etc.) are relatively insensitive, and it is not known whether impacts of historic or ongoing asbestos releases on these media can be detected by these techniques.

2. Identify the Decision

The decision to be made is whether analysis of potential source materials and/or transport media in and about the mine (e.g., mine waste, surface water) and in and about the community of Libby (e.g., yard soil, house dust, garden soil) can be reliably quantified using available techniques. If so, then source areas judged to be of potential concern may be removed at the discretion of the OSC. Alternatively, additional sampling and analysis of

potential source material may be pursued as needed to identify impacted areas and to focus on sources of unacceptable asbestos levels in air.

3. Identify Inputs to the Decision

Asbestos Measurements in Environmental Media

Inputs to the decision will be the results of asbestos analyses of each medium using the best available technique(s), as follows:

Medium	Proposed Method	
	Sample Preparation	Sample Analysis
Yard soil Garden soil Road soil Mine waste Bulk insulation	Collect bulk sample, place on slide	PLM of bulk material
	Collect bulk sample, dry	Visible reflective infrared spectroscopy
	Separate respirable dust fraction using Superfund method, collect dust on filter, collapse filter, prepare TEM grids	TEM of respirable dust
Indoor Dust	Microvacuum into cassette, suspend dust in water/alcohol, collect on filter, dry ash, prepare TEM grids	TEM
Surface Water	Collect bulk sample, filter, collapse filter, prepare TEM grids	TEM

These methods have been selected because they are judged to be the most likely to yield results that will allow qualitative or quantitative evaluation of asbestos levels in environmental media. Note that several alternative methods are identified for soil and related bulk materials. At present, it is not known which of these will be the most appropriate. It is envisioned that all samples will be screened using visible infrared spectroscopy, since this method is very fast and inexpensive. If successful, the results of this method can be used to rank-order samples into "high", "medium" and "low" concentration ranges. For quantitative assessment, it is envisioned that all samples will be analyzed by PLM, since this method is fast and relatively less expensive than the Superfund TEM method. This evaluation will begin with samples that are known or suspected to be high in asbestos concentration, based either on the infrared results and/or field observations such as the presence of visible levels of vermiculite, proximity to known sources or waste materials, etc. The analyses will continue through the samples to those that are known or suspected to contain "low" levels. When asbestos fiber concentrations are consistently below the detection limit, further analyses by PLM may be discontinued. After the results of the infrared and the PLM analyses are available, a set of samples will be selected for analysis by the Superfund method. This method is expected to be the most sensitive, because it includes a preliminary separation of respirable asbestos fibers from the bulk material, and because quantification is by TEM rather than PLM. However, the

method is not yet in wide use, and is associated with a relatively high cost and slow turnaround time. It is for this reason that only about 15-21 samples will be evaluated by this approach. This set will be composed of approximately 5-7 in each of three categories: "high", "medium", and "low". Comparison of results across these three methods will allow an evaluation of which method(s) is (are) most appropriate for on-going evaluation of soils and related materials at the site.

For the other media (dust, surface water), all samples collected will be analyzed by the analytical methods indicated above. A comparison of results across samples will be used to determine whether the method is likely to be reliable and useful for further evaluation of site samples.

Community Interview

EPA will administer a community interview to numerous Libby residents including residents of each household sampled. These interviews will help gauge community members' level awareness about asbestos, their health concerns about asbestos, their knowledge about activities that may result in asbestos exposure, as well as possible sources of asbestos-bearing material. This information may help explain observed asbestos levels in samples from the home. A copy of the interview questionnaire is provided in Section E (Appendices).

4. Define the Study Boundaries

Spatial Bounds

The spatial bounds to be investigated in this project include the community of Libby, and areas associated with former mining activities near the town.

Temporal Bounds

Asbestos levels in source or transport material are expected to be relatively stable. Thus, the time when source area samples are collected is not judged to be critical.

5. Develop a Decision Rule

If no observable difference in asbestos concentration can be detected between the two classes of samples ("high" vs "low"), it will be concluded that a) either the medium is not impacted, or b) the measurement technique is not sufficiently sensitive. If a difference can be detected, it will be concluded that there is an impact to that medium, along with an actual or potential release to the environment, and that the current method can be used to further investigate and quantify that release.

6. Specify Limits on Decision Errors

Because the decision to be made is mainly with regard to method adequacy, no quantitative rules are needed to define decision errors.

7. Optimize the Design for Obtaining Results

Additional source area samples may be collected and incorporated into either Phase 1 and/or Phase 2 as data become available on the ability of current methods to detect and quantify asbestos fibers in each medium.

PARCC Requirements

Within this QAPP, quantitative and qualitative limits are defined for precision, accuracy, representativeness, comparability and analytical completeness. Reporting limits for asbestos fibers are set by the analytical laboratory based on environmental matrix, historical data, and comparison to EPA limits for CLP and other methods. Quantitative limits are also defined by microscopy (light microscopy or TEM) for method detection limits, and for method reporting limits or method quantitation limits. The QA procedures outlined in this section are intended to ensure data quality and to administer corrective actions with the goal of producing data that satisfy the following requirements. General guidelines, policies, and procedures to achieve these objectives are presented below. Where additional, detailed, procedures are required to attain QA objectives and to describe specific methods, these are provided in the SOPs (see attached). The following PARCC requirements apply to more standard chemical analytical analyses, and partially to asbestos analyses (e.g., identifying physico-chemical make-up of specific fibers)

Precision: Precision is defined as the agreement between a set of replicate measurements without assumption or knowledge of the true value. It is a measure of agreement among individual measurements of the same property under prescribed similar conditions. Agreement is expressed as either the relative percent difference (RPD) for duplicate measurements or the range and standard deviation for larger numbers of replicates. The RPD will be reported on required 5% laboratory duplicates.

Accuracy: Accuracy is a measure of the closeness of individual measurements to the "true" value. Accuracy usually is expressed as a percentage of that value. For a variety of analytical procedures, standard reference materials traceable to or available from National Institute of Standards and Technology (NIST, formerly National Bureau of Standards) or other sources can be used to determine accuracy of measurements. Accuracy will be measured as the percent recovery (%R) of an analyte in a reference standard or spiked samples (>3 at each selected concentration range) that span the limit of linearity for the method.

Ideally, precision and accuracy estimates should represent the entire measurement process, including sampling, analysis, calibration, and other components. From a practical perspective, these estimates usually represent only a portion of the measurement process that occurs in the analytical lab.

Representativeness: Representativeness is the degree to which data accurately and precisely represent characteristics of a population, parameter variations at a sampling point, or an environmental condition. For this QAPP, data and samples representative of chemical and biological exposures in the study and reference areas are to be collected from randomly chosen residences.

Comparability: Data are comparable if site considerations, collection techniques, and measurement procedures, methods, and reporting are equivalent for the samples within a sample set. A qualitative assessment of data comparability will be made of applicable data sets. These criteria allow comparison of data from different sources. Comparable data will be obtained by specifying standard units for physical measurements and standard procedures for sample collection, processing, and analysis. Please see the attached SOPs for sampling and analysis procedures.

Completeness: Data are considered complete when a prescribed percentage of the total intended measurements and samples are obtained. Analytical completeness is defined as the percentage of valid analytical results requested, and >90% of analyzed samples should have results reported. For this sampling program, a minimum of 80 percent of the planned collection of individual samples for quantification and a minimum of 30 percent of related parameters (e.g., physical measurements, fiber type, etc.) must be obtained to achieve a satisfactory level of data completeness.

Method Detection Limits (applicable to chemical analyses only): Method detection limits (MDLs) are minimum values that can be reliably measured to identify the analyte as being present in the matrix, versus method quantitation limits are the minimum values that can be quantitated with reasonable scientific confidence. The method will also have a maximum linear value in most situations, and analyses should occur within this limit of linearity range. See applicable operating procedures for details.

Table 1. DQOs for Primary Objective: Evaluate the Need for Time-Critical Action

DQO Step	Description
1. Define the problem	The citizens of Libby appear to have an increased incidence of asbestos-related disease, but there are no data to determine if this disease is attributable solely to historic exposures, or whether current exposures are of continuing health concern.
2. Identify the decision	Is time-critical action needed to protect public health? If yes, identify appropriate action and intervene as necessary If no, determine whether or not non-time-critical remediation is necessary
3. Identify inputs to decision	Level of concern for human health (lifetime excess cancer risk of 1E-03) Estimate of airborne asbestos concentration, and cancer risk per unit concentration.
4. Define study boundaries	<i>Spatial bounds:</i> Community of Libby, including former mining, milling and processing areas and areas potentially impacted as defined by meteorological conditions. If necessary, appropriate background areas are also included (precise locations to be defined). <i>Temporal bounds:</i> multiple air samples will be collected in areas associated with former mining activities near the town seasonally throughout the year
5. Define decision rule	If asbestos levels in indoor air \geq 1E-03 risk level, consider the need for time-critical intervention. If asbestos levels in indoor air $<$ 1E-03 risk level, time-critical intervention may not be necessary. However, additional studies may be needed to determine if non-time-critical remediation is necessary, or if levels might exceed 1E-03 risk levels under different conditions (e.g., seasonal variation)
6. Specify limits on decision errors	Risk management decisions will be based on the highest airborne asbestos concentration found in any residential or occupational building.
7. Optimize the design	Incorporate new information as data become available on actual airborne exposure and risk levels.

TABLE 3. Unit Risk for Inhalation of Asbestos

Population	Percentage of Fibers Greater than 10 um in Length										
	0.50%	1%	2%	4%	6%	10%	15%	20%	30%	40%	50%
Male Nonsmoker											
Lung Cancer	1.0E-02	1.6E-02	3.0E-02	5.4E-02	8.0E-02	1.3E-01	1.9E-01	2.6E-01	3.8E-01	5.0E-01	6.4E-01
Mesotheliomas	1.1E-01	1.9E-01	3.2E-01	6.2E-01	9.0E-01	1.5E+00	2.2E+00	2.9E+00	4.3E+00	5.8E+00	7.2E+00
Total	1.2E-01	2.0E-01	3.5E-01	6.7E-01	9.8E-01	1.6E+00	2.4E+00	3.2E+00	4.7E+00	6.3E+00	7.8E+00
Female Nonsmoker											
Lung Cancer	7.6E-03	1.2E-02	2.2E-02	4.0E-02	6.0E-02	9.6E-02	1.4E-01	1.9E-01	2.8E-01	3.8E-01	4.8E-01
Mesotheliomas	1.3E-01	2.0E-01	3.6E-01	6.8E-01	1.0E+00	1.7E+00	2.5E+00	3.3E+00	4.9E+00	6.5E+00	8.1E+00
Total	1.4E-01	2.1E-01	3.8E-01	7.2E-01	1.1E+00	1.8E+00	2.6E+00	3.5E+00	5.1E+00	6.8E+00	8.5E+00
Mean Total for Nonsmokers	2.6E-01	4.1E-01	7.3E-01	1.4E+00	2.0E+00	3.4E+00	5.0E+00	6.6E+00	9.8E+00	1.3E+01	1.6E+01
Male Smoker											
Lung Cancer	9.4E-02	1.5E-01	2.6E-01	5.0E-01	7.4E-01	1.2E+00	1.8E+00	2.4E+00	3.5E+00	4.7E+00	5.9E+00
Mesotheliomas	7.6E-02	1.2E-01	2.2E-01	4.2E-01	6.0E-01	9.8E-01	1.5E+00	1.9E+00	2.9E+00	3.8E+00	4.8E+00
Total	1.7E-01	2.8E-01	4.8E-01	9.2E-01	1.3E+00	2.2E+00	3.2E+00	4.3E+00	6.4E+00	8.5E+00	1.1E+01
Female Smoker											
Lung Cancer	6.4E-02	1.0E-01	1.8E-01	3.4E-01	5.0E-01	8.2E-01	1.2E+00	1.6E+00	2.4E+00	3.2E+00	4.0E+00
Mesotheliomas	1.1E-01	1.9E-01	3.2E-01	6.2E-01	9.0E-01	1.5E+00	2.2E+00	2.9E+00	4.3E+00	5.8E+00	7.2E+00
Total	1.8E-01	2.9E-01	5.0E-01	9.6E-01	1.4E+00	2.3E+00	3.4E+00	4.5E+00	6.7E+00	9.0E+00	1.1E+01
Mean Total for Smokers	1.7E-01	2.8E-01	4.9E-01	9.4E-01	1.4E+00	2.2E+00	3.3E+00	4.4E+00	6.6E+00	8.8E+00	1.1E+01

Source: Berman and Crump (1999)

Table 2: Summary of Available PCM-Based Exposure Levels for Asbestos

Agency	Description	Nominal Value	Reference
ACGIH	TLV-TWA	0.1 f/cc	ACGIH, 1998
NIOSH	REL 100 minute TWA in a 400L sample (all forms)	0.1 f/cc	NIOSH 1999
OSHA	PEL (TWA) all forms	0.1 f/cc	OSHA 1998 29 CFR 1919.1001
OSHA	PEL (ceiling) 30 minute average - all forms	1.0 f/cc	OSHA 1998 29 CFR 1926.1101
EPA (IRIS)	Inhalation unit risk - all forms	0.23 per (f/mL)	IRIS 1999
EPA (OW)	MCL (f>10 um in length) all forms	7 MFL ^a	EPA 1998

^a MFL = million fibers per liter

Color Map(s)

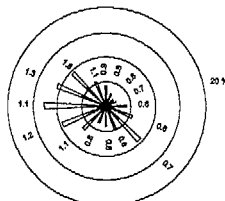
The following maps contain color that does not appear in the scanned images.

To view the actual images please contact the Superfund Record Center at (303) 312-6473.

**Figure 2.1 Libby, Montana
Export Plant
Area To Be Excavated**

Surface Samples

- ND
- <1 %
- 1 %
- 2 %
- 3 %
- ≥5 %

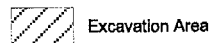


Wind Rose data provided by the
Montana Department of Health
and Environmental Sciences
Air Quality Bureau
Site: 900018 Courthouse Annex
City: Libby
Time Period: 1/1/88 to 12/31/88
Hours 0 to 23
Calm Winds 3.3%
Total Hours 5829

Depth Samples

- ND
- <1 %
- 1 %
- 2 %
- 3 %
- 4 %
- ≥5 %

Analytical Data and
GPS Coordinates
Provided by DOT-VOLPE



Excavation Area

Duplicate Samples

- △ ND
- △ <1
- △ 1 %
- △ 2 %
- △ 3 %
- △ 4 %
- △ ≥5 %



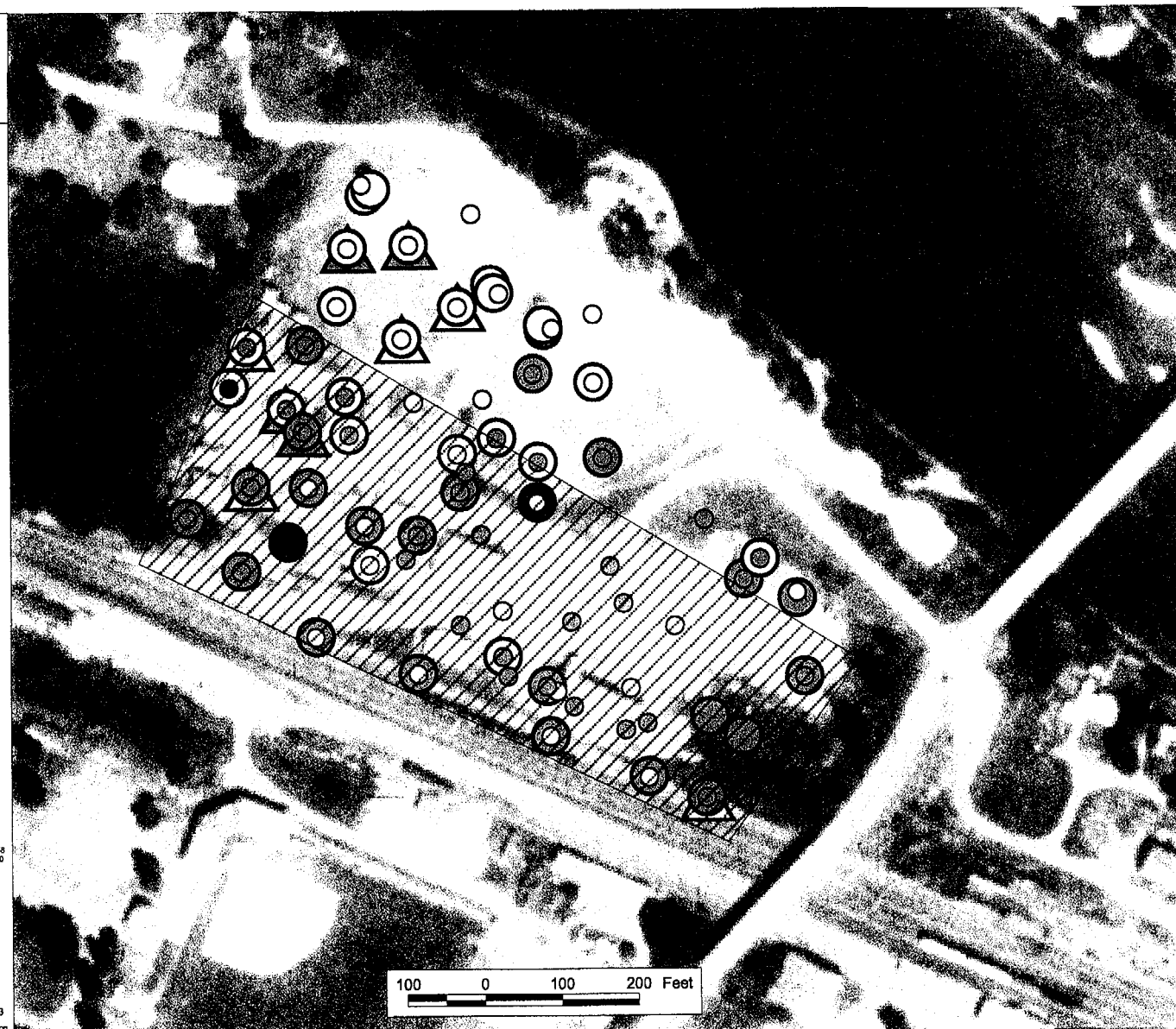
Contract No.: N00174-99-D-003
Delivery Order No.: 0002
Purchase Request No.: 0203 3468
EPA AIG No.: DWH17953800-01-0



Prepared for EPA Region 8 by
SSI Consulting Group, Inc.
Denver, Colorado

May 22, 2000

Map Projection UTM Zone 11 NAD83
report006-D:\msh\project\hcl\figure2_1excavation



100 0 100 200 Feet